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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,337	03/28/2005	Claus Thybo	6495-0090WOUS	2586
7590 11/05/2008 McCorminck Paulding & Huber CityPlace II 185 Asylum Street Hartford, CT 06103-4102				
EXAMINER NALVEN, EMILY IRIS				
ART UNIT		PAPER NUMBER		
3744				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/520,337

**Applicant(s)**

THYBO ET AL.

**Examiner**

Emily Iris Nalven

**Art Unit**

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 7/7/08
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

Receipt of Applicant's remarks filed on July 7, 2008 is acknowledged.

### ***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**Claims 1-11** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In order for a method to be statutory it must show a practical application of an otherwise abstract data. In order to meet this requirement it must (a) show a practical application through a physical transformation or (b) other produce a useful, concrete and tangible result. A physical transformation can be shown if the method transforms an article or physical object into a different state or thing. In the presently claimed invention each of the method steps is intended to be performed in a computer, the human mind, or with the aid of a pencil and paper. There is no physical object which can be or is transformed. Further, the presently claimed invention fails to produce a concrete result. Claim 1 includes the limitation "determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rated of heat flow of the refrigerant across the heat exchanger; and using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived." Claim invention does not produce a tangible result as the mere calculation of a parameter for monitoring the

refrigerant is a functional limitation language which has no impact on the system.

Claims 2-11 incorporate these deficiencies through their dependencies and fail to correct the deficiency, and as such are rejected for the same reason.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1,148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art. 2. Ascertaining the differences between the prior art and the claims at issue. 3. Resolving the level of ordinary skill in the pertinent art. 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 1-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stoecker (*Industrial Refrigeration Handbook*), and further in view of Cengel (*Thermodynamics*).

In regard to claims 1 and 4-7, Stoecker teaches detecting a flash gas in vapor-compression refrigeration comprising a compressor, a condenser, and expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant (Pages 64-68). Stoecker teaches using thermodynamics characteristics of a heat exchanger (see Example 3.1 in pages 66-68) but does

not teach the details of establishing an energy balance. Cengel teaches determining a rate of heat flow of a heat exchange fluid across a heat exchanger and forming an energy balance in detail (Pages 193-195). It would have been obvious to one having ordinary skill in the art at the time the invention was made to detect flash gas using thermodynamics properties of the refrigerant since it has direct relation with cause of flash gas. Establishing an energy balance is a well-known method and it is the 1st Law of Thermodynamics. Additionally, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the mass flow and the specific enthalpy because they are obvious mechanical expedient and one ordinary skilled artisan would normally calculate these parameters for the purpose of studying or varying the flow characteristics.

**In regard to claims 2 and 3**, Cengel teaches determining rate of heat across a heat exchanger (Pages 193-195). Since the evaporator and the condenser are both heat exchangers it would have been obvious to one having ordinary skill in the art at the time the invention was made to determined rate of heat flow of heat exchange fluid flow across a heat exchanger (which might be evaporator or a condenser) in order to establish an energy balance equation.

**In regard to claim 8**, Stoecker teaches that the flash gas develops as the expansion proceeds (Page 65). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to establish the refrigerant mass flow based on a flow characteristics of the expansion device, the

expansion device opening passage and/or opening period, and an absolute pressure before and after the expansion device in order to detect and remove flash gas from the system.

In regard to claim 9, see the rejection for claims 1 and 8 above.

6. **Claims 10, 12 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stoecker (Industrial Refrigeration Handbook) in view of Cengel (Thermodynamics) above, and further in view of Seem (6,223,544).

**In regard to claim 10**, Stoecker in view of Cengel teach the method of detecting flash gas in a vapor, but do not explicitly teach establishing a residual and generating a signal. Seem teaches establishing a residual based on energy balance and indicating a problem with the system (C-6, L-25-67; C-7, L-1-20; Fig. 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a residual as taught by Seem in the system of Stoecker in view of Cengel in order to advantageously determine the problems in the system.

**In regard to claims 12 and 16**, see the rejection for claim 1. Additionally, Stoecker in view of Cengel teach most of the limitations of the claim but do not explicitly teach establishing a residual and generating a signal. Seem teaches establishing a residual based on energy balance and indicating a problem with the system (C-6, L-25-67; C-7, L-1-20; Fig. 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a residual as taught by Seem in the

system of Stoecker in view of Cengel in order to advantageously determine the problems in the system.7.

7. **Claims 11, 13-15 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Stoecker (Industrial Refrigeration Handbook) in view of Cengel (Thermodynamics) and Seem (6,223,544) as applied to claim 10 above, and further in view of Parlos et al. (6,590,362).

**In regard to claim 11**, Stoecker, Cengel, and Seem teach most of the limitations of the claim but do not explicitly teach a fault indicator equation. However, obtaining fault indicator equation for different apparatuses is within the skill and knowledge of one having ordinary skill in the art. An example of this can be seen by Parlos et al. where Parlos et al. teach a fault indicator equation for detecting the mechanical faults (C-7, L-1-8). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to obtain a fault indicator equation in order to determine the faults with the system.

**In regard to claims 13-15**, see the rejection for claims 1 and 4-7.

**In regard to claim 17**, Stoecker in view of Cengel teach most of the limitations of the claim but do not explicitly teach comparing output signal with a previously stored output signal. Seem teaches comparing output signal with a previously stored output signal (C-1, L-60-67; C-2, L-55-61). It would have been obvious to one having ordinary skill in the art at the time the invention was made to compare output signal with a previously stored output signal as taught by Seem in order to advantageously determine the operation condition of the system.

8. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Stoecker (Industrial Refrigeration Handbook) in view of Cengel (Thermodynamics) in view of Knudsen, et al. (US 2003/0156999).

**In regard to claim 18**, Stoecker teaches detecting a flash gas in vapor-compression refrigeration comprising a compressor, a condenser, and expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant (Pages 64-68). Stoecker teaches using thermodynamics characteristics of a heat exchanger (see Example 3.1 in pages 66-68) but does not teach the details of establishing an energy balance. Cengel teaches determining a rate of heat flow of a heat exchange fluid across a heat exchanger and forming an energy balance in detail (Pages 193-195). It would have been obvious to one having ordinary skill in the art at the time the invention was made to detect flash gas using thermodynamics properties of the refrigerant since it has direct relation with cause of flash gas. Establishing an energy balance is a well-known method and it is the 1st Law of Thermodynamics. Additionally, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the mass flow and the specific enthalpy because they are obvious mechanical expedient and one ordinary skilled artisan would normally calculate these parameters for the purpose of studying or varying the flow characteristics. However, neither Stoecker nor Cengel teach activating an alarm based on exceeding a predetermined value.



Knudsen, et al. teach activating an alarm (20) based on a pressure drop in a flash gas compressor (para 32 and see Fig. 1 as heat flow and work is calculated based on a pressure differential). It would have been obvious to one of ordinary skill in the art at the time of the invention to place an alarm as taught by Knudsen, et al. in the system as taught by Stoecker in view of Cengel to notify the users when the system is operating at dangerous or grossly inefficient values in order to prevent breakage and wasteful thermal cycles.

### ***Response to Arguments***

9. Applicant's arguments filed July 7, 2008 have been fully considered but they are not persuasive. The Applicant argues that the claimed invention is directed to a process and as such should not be rejected under 35 USC §101. While the claimed invention may be directed to a process, the process constitutes deriving a heat flow rate parameter which does not produce a tangible result and is merely a calculation, as such not overcoming the rejection. Additionally, the Applicant argues that the claimed invention is not merely an abstract idea. However, as the invention is presently claimed, the methods are aimed at mathematical calculations.

The Applicant argues that Stoecker does not teach the detection of a flash gas and only detects the removed flash gas. However, regardless of what state of transition the flash gas is in, Stoecker does indeed teach the detection of an amount of flash gas in that a level control valve (page 65) opens wider depending on the amount of flash

gas in the system and the liquid level in the system. As the claims call for the detection, Stoecker meets the metes and bounds of the claimed invention.

Additionally, the Applicant argues that Stoecker fails to teach determining a first or second rate of heat flow. However, the heat flow is a known system parameter which is dependant on the size, shape and environment of the system. Stoecker indeed teaches known and accepted values based on specific system parameters so that the heat flow rate can easily be calculated from known scientific formulas.

The Applicant argues that Seem fails to teach a residual detection in an air-handling system. However, Seem teaches a method of residual calculation which is applicable to a variety of systems including an air-handling system. Also, Seem teaches that there is no predictable relationship only when there is no heating or cooling, and thus no heat flux (a heat rate of zero) and as such does not teach away from the claimed invention.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Manole (US 2005/0132729) teaches monitoring flash gas temperatures and pressures.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emily Iris Nalven whose telephone number is (571) 272-3045. The examiner can normally be reached on Monday - Friday 9:00AM to 4:00PM.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834 or Frantz Jules (571) 272-

6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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